Epidemiologic Research and Disasters

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INTRODUCTION

Disasters present a unique challenge for the epidemiologic research community. Disasters are almost always unexpected and their aftermath is typically characterized by a strain on existing infrastructure and resources. These are not the conditions under which the epidemiologic research community typically thrives. However, disasters by definition affect large numbers of people and a growing body of evidence suggests that the consequences of disasters can include multiple health conditions (e.g., cardiovascular disease, respiratory disease, mental health problems), can be far-reaching, and long-lasting (1–3). Although public health departments and federal organizations such as the Centers for Disease Control and Prevention (CDC) provide the first-line of evaluation and intervention after such events, these agencies are typically overwhelmed by the immediate needs after a mass disaster leaving much that needs to be done. The epidemiologic research community then has a unique role it can play after disasters, augmenting the work of public health practitioners. To do so, epidemiologists must identify the most acute areas where they can be of assistance, build on existing resources, and design and implement studies much more quickly than is typical for epidemiologic work. In this commentary we present examples from our own experience designing studies in the aftermath of the September 11, 2001 terrorist attacks in New York City and offer suggestions about the role academic epidemiologists can fruitfully play after disasters.

THE SEPTEMBER 11, 2001 TERRORIST ATTACKS

In the aftermath of the September 11, 2001 terrorist attacks, government and disaster relief agencies started offering services to the persons who were most directly affected by the disaster, including those surviving and evacuating the immediate zone of destruction, first responders, and the families of the missing. However, for many weeks after the disaster, the magnitude of its effects remained unknown and best estimates were subject to continual revision. From

a public health point of view, it quickly became evident that there were three primary questions that warranted rapid assessment soon after the attacks: determining the impact of the attacks on those in and around Ground Zero, assessing the potential impact of the smoke plume from the burning World Trade Center towers in the metropolitan area, and documenting the psychological consequences of the attacks in the general population.

THE WORK OF THE NEW YORK ACADEMY OF MEDICINE

In the first few days after the attack, in consultation with the Commissioner of the New York City Department of Health, we decided that the best use of our skills and resources would be to assess the psychological impact of the disaster on the population. Other research teams throughout the City started to tackle issues related to the persons in and around Ground Zero and to the environmental consequences of the plume. We generated research aims, focusing on assessing the prevalence and correlates of symptoms of post-traumatic stress disorder (PTSD), panic attacks, depression, substance use and abuse, and somatic complaints in the general population with a particular focus on these symptoms in specific groups, such as ethnic minorities and children. Optimistic that telephone communications would be restored quickly, we decided to use random digit phone survey methodology based on our previous experience with the technique and the ability of telephone surveys to efficiently sample the general population. We developed a collaboration with researchers at the Medical University of South Carolina who had prior experience in post-disaster research. A protocol was submitted for institutional review board approval and the decision was made to have two-tiered mental health backup available, including psychiatrists available on pager to offer assistance to survey respondents assessed to require immediate attention. Training of interviewers and a pilot test refined the survey (4). With no clear funding in place, we staked our core funding on getting the project started and applied for an administrative supplement from existing National Institutes of Health (NIH) grants. We obtained partial funding through an NIH supplement to an existing grant and from a foundation days before the first survey started 5 weeks after the disaster.

SUMMARY OF RESULTS DOCUMENTED IN OUR WORK THUS FAR

Our first assessment showed that we were able to recruit a sample that mirrored the 2000 Census and that 7.5% of

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adults living south of 110th Street in Manhattan had symptoms consistent with probable PTSD (5). This was approximately three times higher than what might have been the expected background prevalence of PTSD. We also documented a higher-than-expected prevalence of symptoms of major depression (5). Recognizing that this first assessment only covered the initial period after disaster, and was restricted to a small part of New York City, we planned for, and implemented, assessments 4 months and 6 months after the disaster with the second survey expanded to the five boroughs of New York City, and the third to the New York metropolitan area, over-sampling Manhattan to allow analysis of trends from the first survey. The results across the three surveys showed samples that mirrored the 2000 Census for respective areas sampled, and a decrease in symptom prevalence as time progressed, suggesting resolution of PTSD for more than two-thirds of those meeting original criteria in the first 6 months (6). Importantly, we found that one quarter of those interviewed were “directly exposed” to the attacks, and, as expected, the prevalence of PTSD was higher among those directly exposed compared with other residents. However, the prevalence of PTSD among the less (or indirectly) exposed was not trivial, and these prevalences applied to population totals suggested that the number of persons with symptoms consistent with PTSD who were directly exposed to the attacks was similar to the total number of persons with PTSD who were indirectly exposed (6). This suggested that attention to mental health was important not only for those in the immediate impact zone and their families, but also to a broader class of residents of a disaster area, a relatively new and perhaps controversial observation in the field. While the first survey was performed in Manhattan only, because of limited time and funding but also because of a sense that this would be the area most heavily affected by the disaster, the prevalence of PTSD was as high in the surrounding boroughs, further supporting the notion that mental health consequences are widespread after large disasters (7). We note that several other research groups have performed critically important work in the aftermath of the September 11 terrorist attacks, and our work has built on insights from these research teams (8–11). While in the context of this personal reflection we do not comment on the work of others in detail we refer the reader to published summaries of post-September 11 research that discusses this other work in more detail (12, 13).

LESSONS FOR THE EPIDEMIOLOGIC RESEARCH COMMUNITY FROM THE SEPTEMBER 11, 2001 TERRORIST ATTACKS

There are a number of lessons for the epidemiologic research community that arise from the September 11 terrorist attacks and the response to them. First, in the immediate

post-disaster period, our primary responsibility is to ensure the safety and well-being of students, staff, and faculty. This may seem self-evident, but may easily be forgotten as a large disaster unfolds. In the context of the September 11 attacks, the entire City was at a standstill after the attacks, and the disaster dominated public discourse, work, and most aspects of life in New York City for months thereafter. The sheer number of people who worked in the World Trade Center complex meant that there were several friends or family members of persons who were directly affected by the disaster who were in our team. In addition, the perceived political nature of the attacks, and the inevitable discussions about its roots and potential retribution, brought to the fore political differences between members of our research team that had to be addressed and dealt with. The combination of personal grieving and flaring tempers is challenging and needs a substantial investment of time and effort to address.

Second, it is important, relatively quickly after a disaster, to invest the time and effort to preserve and stabilize ongoing projects. Storing copies of data off-site, frequently taught and perhaps sometimes not practiced as routinely as it should be, is critical when considering the potential of a disaster to wipe out years of work in an instant. As critical as keeping data safely, project infrastructure, within the confines of what is possible after a disaster, should be tended and preserved. A number of projects we carry out in New York City involve community collaboration. With the breakdown in telecommunications and the all-consuming nature of the disaster, shoring up project activities within local community agencies to ensure that projects could resume when appropriate, became critical.

Third, epidemiology research teams can bring both skills and potentially tangible resources to the disaster response. Public health departments are likely to be overwhelmed quickly by a massive disaster and eager to accept help. In the absence of a service provision function, epidemiologic research teams can offer both assessment skills and potentially project personnel who could carry out tasks to assist public agencies. For example, at the time of the September 11 disasters we had just started an investigation of out-of-hospital cardiac arrests, working in concert with the New York City Fire Department (FDNY). Clearly, the project had to be suspended immediately after the attacks. However, the investigators and project managers directing this research, in consultation with the relevant FDNY assistant commissioner, were able to realign our data collectors' task to assist in the recovery effort; our team then took upon itself the responsibility of tracking FDNY staff and their families for the weeks immediately after the disaster. We returned to the project's intended function 6 months after September 11. In terms of assessment skills, the research we described earlier in this commentary started at the behest of the New York Department of Health to

provide a rapid assessment of the burden of mental health need in New York City. Epidemiologic skills became paramount to launch a rapid assessment that was ultimately used by the City in their successful application for funding to the Federal Emergency Management Agency.

Fourth, there are areas where our understanding of the consequences of particular disasters is clearly lacking and which may, as such, represent the more suitable place for the application of research skills. In the context of the September 11 disaster, it became clear early on that the gap in our appreciation of the consequences of the disaster did not concern the persons who were directly exposed to the event, but rather the consequences in the general population. Prior research, conducted after the Oklahoma City bombing of the Murray Federal Building, had provided good estimates of what could be expected in terms of psychopathology among direct victims of this disaster (14), but there was very little published that could provide an estimate of the population burden of this disaster. As such, an area of clear need emerged to which we were able to apply epidemiologic methods to assist in the recovery effort.

RECOMMENDATIONS

The epidemiologic research community is not accustomed to acting quickly. In the context of an unanticipated, unprecedented disaster, the rapid design and implementation of a study was necessary if we were to contribute to the recovery effort in a meaningful way. Unfortunately, disasters are relatively common (15), and it is likely that there will be more, rather than fewer, unanticipated events in future where epidemiologic skills can serve an important function. In the aftermath of the September 11 attacks, municipal health departments across the country, the CDC, and the Public Health Service Commissioned Corps substantially revised policies regarding disaster response, deployability of officers, and training of staff. The epidemiologic research community has a similar opportunity to prepare itself for future disaster eventualities. In the aftermath of September 11, 2001 it became rapidly clear that there existed a dearth of mechanisms for conducting rapid assessments and for documenting the consequences of such an event in the general population. We suggest that improved infrastructure that will allow more efficient mobilization of responses to future events is needed. This will involve a concerted effort by academic institutions to have resources available to allow rapid deployment of epidemiologic studies, and that funders be ready to make review and funding available more quickly than extant “rapid” mechanisms (that frequently take at least 6 months to receive funding). Also, we need to ensure that epidemiology training prepares students for the pos-

sibility that their skills will be needed in these events and that students are equipped with skills in different assessment techniques that will allow them to participate in such efforts in future. We hope that the lessons we learned and our experiences in the aftermath of the September 11 attacks never need to be extended to others, but suggest that they probably ought not to be ignored.

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